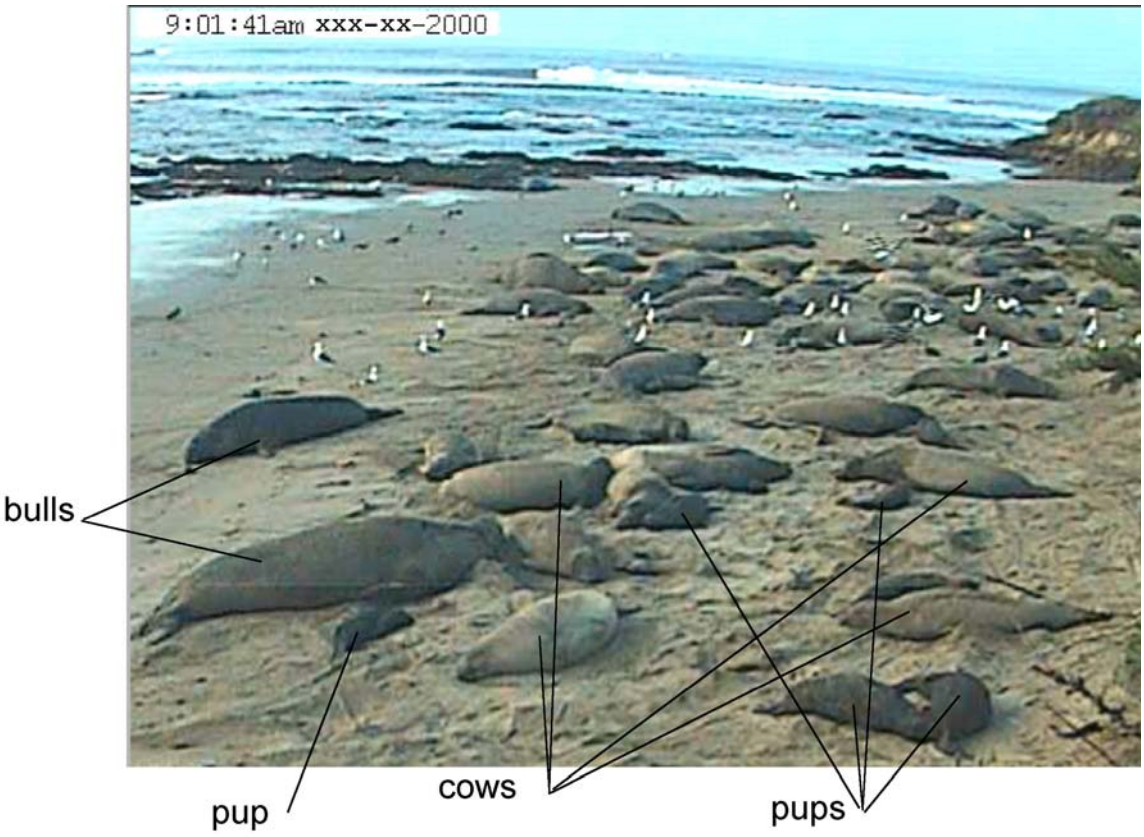
## Introduction

In this computer exercise you will analyze data from a movie made up of 900 pictures. The pictures were taken at 9am every morning for 2 1/2 years with a web camera at Año Nuevo State Park. The camera was at a beach where elephant seals mate and give birth to their pups. In these pictures you will be able to see how the elephant seals come and go, and how they change throughout the year.

The period of time when the bulls (males) are present is not exactly the same as when the cows (females) are present, and the females are not present at exactly the same times when the pups are present. Each picture has the date marked in the upper left hand corner, and you can move through the pictures using the left and right arrow keys on your keyboard.




### Identifying elephant seals

**Bulls**: Bulls are very large, and have a huge nose (proboscis). Also, their fur often looks darker than the females. (This may be because they go into the water more often than the females, and the water makes their fur look darker.)

**Cows**: The females are smaller than the bulls and often have lighter looking fur.

**Pups**: The pups are very small, and have black fur when they are very young, but they grow in size quickly and their fur becomes brown.

## The Scientific Method

The scientific method is a way of finding out about nature.

- The scientific method is based on observing things around you, physical things you can see, hear, touch, taste, or smell.
- You ask questions about the things you observe. The kinds of questions you ask must be questions that can be answered by seeing, hearing, touching, tasting, or smelling (or using instruments that can do that for you).
- You form a hypothesis. A hypothesis is a good guess to your question that is based on what you already know.
- You collect data (information) that you can use to test your hypothesis (see if you were right or wrong).
- You examine or analyze the data to see if your hypothesis was correct or incorrect.
- Form a conclusion. What does your data tell you about your hypothesis. If the data does not support your hypothesis, can you think of reasons why you were wrong? Can you think of new questions to answer?

## Using the scientific method:

In this exercise you are given a question that can be answered by carefully going through the elephant seal pictures.

The question is “What time of year are elephant seal pups born?”.

It is your job to:

1. make a guess (form a hypothesis) about the answer to the question,
2. go through the pictures and gather data that can help you test your hypothesis,
3. analyze the data to see if your hypothesis is correct,
4. form a conclusion about you results (is you hypothesis correct or incorrect?). If your hypothesis is not correct, think of reasons why being born at a different time of year might be better for the pups than the time you thought.

Use the data sheet to record your answers.

## Data Sheet

**Ask the question:**

At what time of year are elephant seals born?

**Form a hypothesis:**

I think elephant seal pups are born in the:

A) spring B) summer C) fall D) winter (circle one)

I think my hypothesis (they are born this time of year) is correct because.

_____

_____

_____

**Collect the data:**

Step through the pictures using the arrow keys until you see newborn pups with black fur like the ones shown in the picture on the first page.

Write down the date that you first see newborn pups then step through the pictures writing down the next 4 days that you clearly see pups. (do this for each year). Also write down the number of pups you can see in each picture.

| Year | Date | Number of pups |
|---|---|---|
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |

**Analyze the data:**

Look at the dates you have written down for when elephant seals pups are first present on the beach.

What time of year do the pups appear the first year? _____

What was the most number of pups you saw in a picture the first year?

_____

What time of year do the pups appear the second year? _____

What was the most number of pups you saw in a picture the second year?

_____

Did you have difficulty identifying the pups? _____

What other problems did you have? _____

**Form a conclusion:**

Does the data support your hypothesis? (y/n) _____

What can you conclude about the time of year elephant seals are born?

_____

_____

_____

If the seals are not born when you thought they would be, can you think of a reason why it might be better for them to be born when they were? (Hint: the water is very cold in the winter time.)

_____

_____

_____

Can you think of other questions that the pictures could help to answer?

_____

_____

_____